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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/540,881	01/18/2006	Kozo Takatsu	274437US0PCT	1795

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EXAMINER	
SINGH, PREM C	

ART UNIT	PAPER NUMBER
1797	

NOTIFICATION DATE	DELIVERY MODE
11/24/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/540,881	TAKATSU ET AL.	
	Examiner	Art Unit	
	PREM C. SINGH	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 October 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4 and 7-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4 and 7-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/15/2008 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-4 and 7-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takashi et al (Japanese Patent Abstract No: 2001-278602) in view of Feimer et al (US 2002/0157990 A1).

5. With respect to claim 1, Takashi discloses removal of sulfur compounds from a petroleum system hydrocarbon feed by first contacting the feed with a first adsorbent (it is to be noted that Takashi uses the term “devulcanizing agent” for desulfurization agent) to remove benzothiophenes or dibenzothiophenes and then with a second adsorbent to remove mercaptans, thiophenes, dibenzothiophenes, sulfides, and disulfides (See paragraph 0004 and 0005).

Takashi discloses a desulfurizing agent A comprising silica, alumina, silica-alumina, zeolite, etc. as desulfurizing agent supports which may be used independently

or as combinations of two or more (See paragraph 0008). Takashi also discloses using at least one metal component selected from the group consisting of Cu, Ni, Zn, Mn, Fe and Co (See paragraph 0010).

Takashi also discloses that for the second adsorbent (desulfurizing agent B), there is especially no limit, it may use another desulfurizing agent and may use hydrodesulfurization catalysts such as Co-Mo/Alumina and Ni-Mo/Alumina (See paragraph 0010). It is to be noted that Co-Mo/Alumina and Ni-Mo/Alumina are metal component-carried on a porous inorganic oxide.

Takashi discloses LPG, gasoline, naphtha, kerosene, and gas oil as the preferred petroleum system hydrocarbons (See paragraph 0008).

Takashi invention does not specifically disclose using cerium oxide as a component of desulfurizing agent B.

Feimer invention discloses a process for desulfurization of hydrocarbon feed (boiling range 10-230^{o}C) similar to Takashi under similar operating conditions using Co and one or more Group VI metals (such as Mo) on a suitable support similar to Takashi (See paragraph 0026, 0036, 0037). Feimer also discloses use of lanthanide oxides, including cerium oxide (See paragraph 0037). Feimer's teaching clearly indicates that any support selected from the group consisting of alumina, silica, silica-alumina, cerium oxide, and zeolite is functionally similar (See page 8, claim 9).

Thus, it would have been obvious to one skilled in the art at the time of invention to modify Takashi invention and use a combination of cerium oxide and Co-Mo/alumina

as desulfurizing agent B as disclosed by Feimer because cerium oxide is functionally similar to alumina.

6. With respect to claim 2, Takashi does not specifically disclose that the desulfurizing agent A has higher desulfurizing performance to sulfides and disulfides than desulfurizing agent B and desulfurizing agent B has a higher desulfurizing performance to carbonyl sulfide than that of desulfurizing agent A. However, Takashi uses desulfurizing agents similar to the Applicant's claim. Thus, Takashi invention should necessarily be having similar performance of desulfurizing agents A and B as claimed.

7. With respect to claim 3, Takashi invention discloses desulfurizing agent to be 40-80% of the total quantity of desulfurizing agents (A and B) (See paragraph 0010).

8. With respect to claim 4, Satokawa invention discloses using Y- and beta-zeolites (See page 2, paragraph 0023)..

9. With respect to claim 7, Takashi invention discloses temperature of the desulfurizing bed to be from –40 to 100^{o}C (See paragraph 0009).

10. With respect to claims 8 and 9, Takashi invention discloses LPG and naphtha fraction as hydrocarbon containing gas for fuel cell (See paragraph 0008).

Takashi invention does not specifically disclose LPG and naphtha containing less than 0.1 weight ppm carbonyl sulfide. However, the invention does disclose that total sulfur content must be below 0.2 weight ppm (See paragraph 0002). Since Takashi's disclosure of total sulfur content includes mercaptans, thiophenes, benzothiophenes, dibenzothiophenes, sulfides, and disulfides (See paragraph 0005), it includes carbonyl sulfide also. When the concentration of all sulfur compounds is below 0.2 weight ppm, clearly, the concentration of carbonyl sulfide must be below 0.1 weight ppm.

11. With respect to claim 10, Takashi invention discloses desulfurization of LPG and naphtha fraction by using a desulfurizing agent comprising a zeolite (See paragraph 0008).

12. With respect to claims 11 and 14, Takashi invention discloses a process for producing hydrogen for a fuel cell by contacting the petroleum system hydrocarbon (LPG, gasoline, naphtha, kerosene) after conducting the desulfurization process of the invention, with a steam reforming catalyst (See paragraph 0012).

13. With respect to claims 12 and 15, Takashi invention discloses using ruthenium base or nickel base catalyst for steam reforming (See paragraph 0012).

14. With respect to claim 13, Takashi invention discloses using LPG and naphtha fraction as hydrocarbon containing gas for fuel cell (See paragraph 0008).

15. With respect to claim 16, Takashi invention discloses that the desulfurizing agent A comprises zeolite as support (See paragraph 0008) with at least one metal component selected from the group consisting of Cu, Ni, Zn, Mn, Fe and Co (See paragraph 0010). Feimer invention discloses that the zeolite has beta and/or faujasite structure (See paragraph 0037). Takashi further discloses that the desulfurizing agent B is Ni-Mo/alumina (See paragraph 0010). Feimer discloses that the desulfurizing agent B is Co-Mo on any support including alumina and cerium oxide (See paragraph 0036 and 0037). Thus, it would have been obvious to one skilled in the art at the time of invention to modify Takashi invention and use a combination of cerium oxide and Ni-Mo/alumina because Ni and Co belong to same Group in the Periodic Table and expected to be functionally similar and cerium oxide is functionally similar to alumina (See Feimer, page 8, claim 9).

Response to Arguments

16. Applicant's arguments with respect to claims 1-4 and 7-15 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Prem C. Singh whose telephone number is 571-272-6381. The examiner can normally be reached on 7:00 AM to 3:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/In Suk Bullock/
Examiner, Art Unit 1797